Thrips from Maui and Molokai[1]

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A collection of thrips was made by Krauss at widely scattered localities on the islands of Maui and Molokai during the period from May 29 to June 13, 1943 and again on Molokai from October 8 to 12, 1943, and the specimens were examined by Sakimura. Since no extensive collections have been made on these two islands, very little of the thysanopterous fauna, especially of the introduced species in the cultivated lowlands, has been known. The present collection contributes somewhat toward a further knowledge. A complete list of species now known from these two islands is given at the end of the paper; 24 forms are listed from Maui and 25 from Molokai. The most significant discovery was of the establishment on Molokai of the California bean thrips (*Hercothrips fasciatus* [Perg.]), whose invasion into the Hawaiian Islands has long been feared.

Organothrips bianchii Hood

* Honouliwai, Molokai: *Colocasia esculenta* (taro), petioles.

* Halawa Valley, Molokai: *Colocasia esculenta* (taro), petioles.

Moderate and heavy infestations of this unique thrips were found at the respective localities. This species was first discovered on Oahu and Hawaii during 1939 (3) (7) and its distribution now includes Molokai.

Heliothrips haemorrhoidalis Bouché (greenhouse thrips)

Olinda, Maui: *Rubus penetrans,* leaves and stems.

Hypochaeris radicata (gosmore), leaves.

Peach, leaves.

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* Throughout this paper a single asterisk indicates that collection was made during October, 1943.

* Near edge of Waikolu Valley, Molokai: *Vaccinium calycinum* (ohelo), leaves.

A localized heavy infestation was found at Olinda on *Rubus penetrans,* which is a cultivated but escaped species, and on the two other plants growing nearby in a gulch with mixed undergrowth and a few trees. Another heavy infestation was found on ohelo, a native fruit shrub, in the rain forest at the edge of Waikolu Valley. Despite the fact that this species has been known in the Hawaiian Islands since 1892 (1), and it was stated as early as 1921 that "it is quite abundant in the forest areas of various islands" (5), actual records of collection were from Kauai, Hawaii, and Oahu only. There is an unpublished record that this species was collected from boysenberry (*Rubus loganobaccus* hybrid?) at the Haleakala (Maui) Substation of the Hawaii Agricultural Experiment Station in 1939 by Dr. F. G. Holdaway. These are apparently the first records from Maui and Molokai. All five plants are new Hawaiian host records.

Hercothrips fasciatus (Perg.) (bean thrips)

Kaunakakai, Molokai: *Argemone alba* var. *glauca* (prickly poppy), leaves, buds, and flowers.

This is apparently the first discovery of this species in the Hawaiian Islands. It was probably introduced from California on plant material, possibly oranges. This is the second immigrant thrips discovered within the past year, the first being *Frankliniella* sp. Verification has been requested of Mr. Dudley Moulton for the determination of *H. fasciatus.*

A very heavy infestation was found, on June 4, on several plants of this host growing together on the bank of a dry stream bed just outside of the town. The vegetation in the vicinity was typical of dry, weedy uncultivated areas, and there were few cultivated plants in the vicinity. Further examinations were made in June of the same host plant in other parts of Kaunakakai as well as quite extensively in the area between Hoolehua and the south coast, but no other infestation was found.

In October a far more extensive search of the island for this species was made. Known host plants including the prickly poppy, sow thistle (*Sonchus oleraceus*), cotton, bean, pea, and also many potential hosts were examined in Kaunakakai and vicinity, and in many other parts of the island but no thrips of this species were found. The original infestation in Kaunakakai apparently died out during the hot dry weather of summer, but there seems a bare possibility that the species will reappear during the next rainy season.

Hercinothrips femoralis (Reuter) (banded greenhouse thrips)

Although this species was not collected on these trips, there is an unpublished record that it was found at Wailua, Maui on young fruits of banana causing extensive silver and bronze scars. The specimens were collected by Mr. J. Shigeta in January, 1943 and forwarded by Dr. F. G. Holdaway for determination. This species has been known in the Hawaiian Islands since 1930 (12), but has only been recorded from Oahu, so that this is the first record from Maui. Although this thrips has frequently been collected from various greenhouse plants, collection from outdoor plants has been previously made only once—on *Emilia sonchifolia* (18). Two other new outdoor records are from *Plantago major* at Kalihi, Oahu, collected by Mr. W. C. Look in March, 1943, and from *Emilia sonchifolia,* on which they were flourishing, in a pineapple field at Waipio, Oahu in November, 1942. These records indicate that this species, as on the mainland, occasionally builds up high populations outdoors under certain conditions. Banana and *Plantago* are new Hawaiian host records.

Selenothrips rubrocinctus (Giard) (red-banded thrips)

Wailuku, Maui: *Mangifera indica* (mango), leaves.

Eastern Molokai: *Schinus terebinthifolius* (Christmas berry tree), leaves.

The infestation on mango was heavy. Although the occurrence of such a common species, known in the Hawaiian Islands since 1909 (6), might be expected on every island, specimens from Maui and Molokai have never been previously recorded. Hawaii and Lanai are still not on the distribution list.

Frankliniella sp.

Haiku, Maui: Hibiscus, flowers.

Olinda, Maui: *Rubus penetrans,* flowers.

Kaunakakai, Molokai: Hibiscus, flowers.

* *Ipomoea cairica* var. *lineariloba* (Molokai morning glory), flowers.

* *Gossypium brasiliense* (cotton), flowers.

* Near Kahualelepulu, Molokai: *Argemone alba* var. *glauca* (prickly poppy), flowers.

* Hoolehua, Molokai: *Argemone alba* var. *glauca* (prickly poppy), flowers.

Moomomi, Molokai: *Tribulus cistoides* (nohu), flowers.

This is the same species that was recorded under the name of *F.* near *occidentalis* (Perg.) when first discovered on Oahu during

August, 1924 (15). Evidence indicates that this must be a recent immigrant species from a source not yet known. This species is an extremely polyphagous feeder, mainly on flowers, and no known Hawaiian species has a comparably wide host range. The formal determination of the species has not yet been received from Dr. J. D. Hood. More details on its host range, distribution, populations, life history, and inability to transmit the yellow spot virus will be reported in other papers.

This species has now been discovered on Maui and Molokai, and its adaptability in a new territory is very significant. Although many flowers known to be its hosts were examined during June, it was found only on three plants at four places and the infestations were generally light except the one at the dry sandy beach of Moomomi. Since this is definitely a dry land species, the low general populations must have been due partly to the season and partly to the districts where collections were made. However, the second collection made on Molokai during October and additional collections from Maui made by Mr. K. I. Hanson and Dr. F. G. Holdaway indicate that this species is as common and abundant on these islands during the dry season as it is on Oahu. Heavy and moderate infestations were found by Mr. Hanson on hibiscus flowers at Lahaina in July and August, and at Mala and Haiku in October, and by Dr. Holdaway on eggplant flowers at Lahaina in August.

Taeniothrips simplex Morison (gladiolus thrips)

Haiku, Maui: Gladiolus, leaves.

A moderate infestation was found of the famous gladiolus thrips which has been established on Maui since 1932 (4). There was no opportunity to examine gladiolus on Molokai where its presence has not yet been reported.

Thrips hawaiiensis (Morgan) and **T. hawaiiensis** f. **imitator** Pr.

(Hawaiian thrips)

Kahakuloa, Maui: *Vitex trifolia* var. *simplicifolia* (polinalina), flowers.

Iao Valley, Maui: *Aleurites moluccana* (kukui), flowers.

Haiku, Maui: *Samanea saman* (monkeypod), flowers.

Nahiku, Maui: *Psidium guajava* (guava), flowers.

Hana, Maui: *Dioclea violacea* (maunaloa), flowers.

Olinda, Maui: *Rubus penetrans,* flowers.

Kaunakakai, Molokai: *Batis maritima,* flowers.

Hibiscus, flowers.

Calotropis gigantea (crown flower), flowers.

* *Ipomoea cairica* var. *lineariloba* (Molokai morning glory), flowers.

Mapulehu, Molokai: *Dioclea violacea* (maunaloa), flowers.

Near edge of Waikolu Valley, Molokai: Rose, flowers.

Kalae, Molokai: *Acacia confusa,* flowers.

* Hoolehua, Molokai: *Argemone alba* var. *glauca* (prickly poppy), flowers.

These are very common flower thrips in the Hawaiian Islands and were frequently collected from various hosts on these trips. Populations were generally high on these hosts except on the ones in the drier sections and on those collected during October. This indicates that their preferred habitats apparently are wet or shady areas which is quite contrary to the preference of the other flower thrips, *Frankliniella* sp. Specimens from Molokai have not been recorded before, but their distribution now definitely includes all the Hawaiian Islands. The record from Hawaii is of specimens collected from cotton at Kona during 1928 (8). These species are also widely distributed among the Pacific islands. New local host records are polinalina, kukui, monkeypod, maunaloa, *Rubus penetrans, Batis,* crown flower, Molokai morning glory, *Acacia confusa,* and prickly poppy.

These species were originally described under the name of *Euthrips hawaiiensis* Morgan from specimens collected at Honolulu during 1909 (10), but later were transferred by Moulton to the genus *Taeniothrips* (11), which is the familiar name to the local entomologists. Priesner subsequently separated them into two groups: one with non-segmented styles—*Thrips hawaiiensis;* and the other with 2-segmented styles—*Thrips hawaiiensis* f. *imitator* (16). Sakimura has long known that an incidental number of the local specimens have non-segmented styles but has used only the name of the original species instead of separate names, because Priesner's reference has not been available to be consulted. After critical examination of many local specimens collected on these trips as well as of other collections, it was found that the predominating species is *imitator* and it is desirable to use separate names to distinguish the two forms. In the June collection alone, 91 out of the 107 individuals were *imitator.* A mixed colony was sometimes found on a single host plant but always *hawaiiensis* was in lesser numbers and a pure colony of *hawaiiensis* has not yet been encountered. Among a series of *hawaiiensis,* the true form—styles of both antennae non-segmented — was scarce. The majority were transitional forms, such as individuals either with partially segmented styles of both antennae, or a 2-segmented style of one antenna and a partially segmented style of the other, or a non-segmented style of one and a partially segmented style of the other. In addition, another anomalous antenna rarely found was 6-segmented, with shorter total length, shorter and narrower third

segment without sense cone, prolonged fifth segment, and non-segmented style. One specimen with both antennae of this type and another with one antenna of this type and the other of the normal 8-segments were found among the present material. It will be desirable to run a breeding experiment of these different forms to know the true interrelationships between them, that will provide a ground for clarifying the nomenclature of these two forms as is apparently necessary on the basis of the field population data.

Thrips tabaci Lind. (onion thrips)

Iao Valley, Maui: Onion, leaves.
Haiku, Maui: Onion, leaves.

Thrips (Isoneurothrips) australis (Bag.)

* Near edge of Waikolu Valley, Molokai: *Eucalyptus* sp., flowers.

A large number of specimens was collected from the flowers. This species was first discovered on Oahu during 1938 (2), and is rather common on *Eucalyptus* flowers. This is the first record from Molokai.

Thrips (Isoneurothrips) sp.

Near edge of Waikolu Valley, Molokai: *Broussaisia* sp., flowers.

A heavy infestation of this probably indigenous species was found on this native plant in the rain forest area at 3500 feet elevation. This species is very closely related to the indigenous *T.* (*I.*) *antennatus* (Moulton) but is undoubtedly distinct from all the Hawaiian species of this genus and probably is an undescribed species. The final determination has been requested of Mr. Moulton whose report is expected in the near future.

Thrips (Isoneurothrips) sp.

* Near edge of Waikolu Valley, Molokai: *Raillardia molokaiensis* (naenae), leaves.

A heavy infestation of another probably indigenous species was found on another native plant in the rain forest within a short distance of the site where the preceding species was collected. The present species is also distinct from all Hawaiian species of this genus but somewhat resembles *T.* (*I.*) *dubautiae* (Moulton) and probably is an undescribed species. However, final determination is withheld until further study will be made.

Thrips (Microcephalothrips) abdominalis Cwfd. (composite thrips) Iao Valley, Maui: *Tithonia diversifolia* (tree tithonia), flowers.

Infestation was moderate. The first record from Maui is of a collection made at Makena during 1940 on a previous trip by Krauss (9). Another moderate infestation was found by Mr. B. Kumabe on dahlia flowers at Wailuku, Maui in October, 1943. Specimens were forwarded by Dr. F. G. Holdaway for determination. This species has been known in the Hawaiian Islands since 1926 (11) and is distributed on Oahu and Kauai also.

Oedemothrips laticeps Bag.[3]

* Near edge of Waikolu Valley, Molokai: sweeping.

A single specimen was collected by sweeping among various shrubs and trees in the rain forest. The type specimens of this indigenous species were collected in 1896 and 1900 at three localities on Oahu (1). As far as published records are concerned, the next specimen was collected in 1935 again from Oahu (13), so that this is the fifth collection and the first record from Molokai.

Hoplothrips flavitibia Moulton

Iao Valley, Maui: *Aleurites moluccana* (kukui), under bark of dead log.

Many specimens, including immature stages, were collected in a typical habitat for this common phloeophilous (bark-loving) species of the Hawaiian forest. All except one female were brachypterous forms. According to published records, this is the first record from Maui as it has been known only from Oahu where the type specimens were collected in 1927 (11). Since this species is also distributed on other Pacific islands (14), there is little doubt that it will be found on other islands of the Hawaiian group.

Haplothrips fusca Moulton

Kaunakakai, Molokai: *Batis maritima,* flowers.

Near edge of Waikolu Valley, Molokai: *Cladium angustifolium* (a sedge), flowers.

Moderate infestations were observed at both places. *Batis* was growing in a shoreside swamp and *Cladium* was found along a roadside in the rain forest. The type specimens were collected from *Batis maritima* on Oahu during 1927 (11), and the second collection was made in a wind trap on Molokai during 1933 (17)

[3] This species has been referred to *Nesothrips hawaiiensis* Kirk. See paper by F. A. Bianchi in this issue (p. 31) [Ed.].

but the host was not known there. The next specimens were caught, again on the type host, at Koko Head, Oahu during 1940. *Batis* and *Cladium* are the only known hosts and the former seems to be the preferred one. It is interesting to note that a colony mixed with *Haplothrips gowdeyi* was observed at Koko Head and also on an unknown host at Kaunakakai on these trips.

Haplothrips gowdeyi (Frank.) (black flower thrips)

Hana, Maui: *Plantago major* (plantain), flowers.
Dioclea violacea (maunaloa), flowers.
Wailuku, Maui: *Cenchrus* sp. (sandbur), flowers.
Kaunakakai, Molokai: *Commelina diffusa* (honohono), flowers.
Calotropis gigantea (crown flower), flowers.
Near edge of Waikolu Valley, Molokai: *Taraxacum officinale* (dandelion), flowers.
Kawela, Molokai: Tomato, leaves.
Cenchrus sp. (sandbur), flowers.
Zinnia pauciflora, flowers.
Moomomi, Molokai: *Tribulus cistoides* (nohu), flowers.
Hoolehua, Molokai: *Verbesina encelioides* (golden crown beard), flowers.
* *Argemone alba* var. *glauca* (prickly poppy), flowers.

This is an extremely common and abundant thrips in the Hawaiian Islands and many specimens were collected from various hosts on these trips. The first specimen, mentioned under the name of *Anthothrips usitatus* Bag., was collected on Hawaii in 1892 (1), and many have been collected since from all the islands. This species is also widely distributed among the Pacific islands. Maunaloa, crown flower, dandelion, *Zinnia pauciflora,* nohu, and prickly poppy are new local host records.

LIST OF THRIPS KNOWN FROM MAUI AND MOLOKAI

Terebrantia	Maui	Molokai
Aeolothrips fasciatus (Linn.)	×	
Organothrips bianchii Hood		×**
Heliothrips haemorrhoidalis Bouché	×**	×**
Hercothrips fasciatus (Perg.)		×**
Hercinothrips femoralis (Reuter)	×**	
Selenothrips rubrocinctus (Giard)	×**	×**
Anaphothrips swezeyi Moulton		×
Frankliniella sp.	×**	×**
Taeniothrips alliorum Pr.	×	×
Taeniothrips frici (Uzel)	×	
Taeniothrips simplex Morison	×	
Thrips hawaiiensis (Morgan)	×	×**

Thrips hawaiiensis f. imitator Pr.	×	×**
Thrips nigropilosus Uzel	×	
Thrips saccharoni Moulton		×
Thrips tabaci Lind.	×	×
Thrips (Isoneurothrips) australis (Bag.)		×**
Thrips (Isoneurothrips) multispinus Bag.		×
Thrips (Isoneurothrips) sp.		×**
Thrips (Isoneurothrips) sp.		×**
Thrips (Microcephalothrips) abdominalis Cwfd.	×	
Plesiothrips panicus (Moulton)[4]		×
Merothrips hawaiiensis Moulton		×
Tubulifera		
Dermothrips hawaiiensis Bag.	×	
Oedemothrips laticeps Bag.		×**
Hoplothrips angusticeps (Bag.)		×
Hoplothrips dubius (Bag.)		×
Hoplothrips flavipes (Bag.)	×	
Hoplothrips flavitibia Moulton	×**	
Hoplothrips hawaiiensis Moulton	×	
Hoplothrips intermedius (Bag.)	×	
Hoplothrips lanaiensis (Bag.)		×
Hoplothrips mauiensis Moulton	×	
Hoplothrips ovatus (Bag.)	×	
Hoplothrips swezeyi Moulton	×	
Macrophthalmothrips hawaiiensis Moulton	×	
Karnyothrips melaleuca (Bag.)		×
Haplothrips fusca Moulton		×
Haplothrips gowdeyi (Frank.)	×	×
Aleurodothrips fasciapennis (Frank.)		×
Phloeothrips mauiensis Moulton	×	

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** Heretofore unrecorded species on the island.

[4] As Dr. J. D. Hood originally suggested in private correspondence, this species was found to fit fully the description of *P. perplexus* (Beach), but since specimens of *P. perplexus* are not now available for comparison, establishment of the synonym is withheld until such examination can be made. See Hood, Rev. de Ent. **6**(2): 258, 1936.

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